Claims:

1. A method of preparing a polycarbonate oligomer mixture comprising the steps of:

(a) providing an equilibration system comprising a vessel, a reaction mixture contained within the vessel, and means for mixing the reaction mixture contained within the vessel wherein the reaction mixture comprises,

i. a melted activated diaryl carbonate composition, and

ii. a catalyst present in sufficient amount to initiate an oligomerization reaction between a dihydroxy composition and the activated diaryl carbonate to form polycarbonate oligomers,

(b) introducing a melted dihydroxy composition to the reaction mixture contained within the equilibration system,

(c) maintaining the reaction mixture contained within the vessel at an oligomerization temperature, said oligomerization temperature being below the melting point of the dihydroxy composition, and sufficiently high to allow formation of a homogeneous melt within the vessel, and

(d) continuously drawing off a product stream from the equilibration system, wherein the product stream comprises a polycarbonate oligomer mixture.

2. The method of claim 1, wherein the melted dihydroxy compound is provided from a melting apparatus, and wherein the dihydroxy compound has a total residence time in the melting apparatus and the equilibration system such that the polycarbonate oligomer mixture has a Yellowness Index (YI) of less than 10.

3. The method of claim 2, wherein the residence time in the melting apparatus is less than 30% of the residence time in the equilibration system.

4. The method of claim 2, wherein the melted dihydroxy compound is provided from a melting apparatus, and wherein the dihydroxy compound has a total residence time in the melting apparatus and the equilibration system such that the polycarbonate oligomer mixture has a Yellowness Index (YI) of less than 5.

5. The method of claim 2, wherein the melting apparatus comprises a thin film turbulizing melter.

6. The method of claim 1, wherein the reaction mixture is maintained at an oligomerization temperature of between 140 °C and 300 °C.

7. The method of claim 1, wherein the dihydroxy composition comprises bisphenol A (BPA).

8. The method of claim 7, wherein the dihydroxy composition further comprises one or more additional dihydroxy compounds different from BPA.

9. The method of claim 1, wherein the dihydroxy composition consists essentially of BPA.

10. The method of claim 1, wherein the activated diaryl carbonate composition comprises bismethylsalicylcarbonate (BMSC).

11. The method of claim 10, wherein the activated diaryl carbonate composition further comprises one or more additional diaryl carbonate compounds different from BMSC.

12. The method of claim 10, wherein the dihydroxy composition comprises BPA.

13. The method of claim 1, wherein the activated diaryl carbonate composition consists essentially of BMSC.

14. The method of claim 1, wherein the dihydroxy composition is introduced to the reaction mixture in a melted state and is melted by means which prevent substantial degradation of the dihydroxy composition.

15. The method of claim 1, wherein the diaryl carbonate composition is melted by means which prevent substantial degradation of the diaryl carbonate.

16. The method of claim 1, wherein the equilibration system is operated at atmospheric pressure under a substantially oxygen-free atmosphere.

17. The method of claim 1, wherein the means for mixing the reaction mixture comprises a recirculation feed whereby a portion of the polycarbonate oligomer mixture is recirculated to the equilibration system.

18. The method of claim 17, wherein the recirculation feed flow rate is higher than the feed flow rate of dihydroxy composition.

19. The method of claim 17, wherein the dihydroxy composition is combined with the recirculation feed prior to introduction to the equilibration system.

20. The method of claim 1, wherein the dihydroxy composition and the diaryl carbonate composition are present in molar ratios of 0.25:1 to 3:1.

21. The method of claim 20, wherein the dihydroxy composition and the diaryl carbonate composition are present in molar ratios of 0.9:1 to 1.5:1.

22. The method of claim 1, wherein the reaction mixture is maintained at a temperature of 10 °C lower than the melting temperature of the highest melting dihydroxy compound.

23. The method of claim 22, wherein the reaction mixture is maintained at a temperature of 30 °C lower than the melting temperature of the highest melting dihydroxy compound.

24. The method of claim 23, wherein the reaction mixture is maintained at a temperature of 100 °C lower than the melting temperature of the highest melting dihydroxy compound.

25. A method for preparing polycarbonate, comprising the steps of:

(i) preparing a polycarbonate oligomer mixture comprising the steps of:

(a) providing an equilibration system comprising a vessel, a reaction mixture contained within the vessel, and means for mixing the reaction mixture contained within the vessel wherein the reaction mixture comprises,

i. a melted activated diaryl carbonate composition, and

ii. a catalyst present in sufficient amount to initiate an oligomerization reaction between a dihydroxy composition and the activated diaryl carbonate to form polycarbonate oligomers,

(b) introducing a melted dihydroxy composition to the reaction mixture contained within the equilibration system,

(c) maintaining the reaction mixture contained within the vessel at an oligomerization temperature, said oligomerization temperature being below the melting point of the dihydroxy composition, and sufficiently high to allow formation of a homogeneous melt within the vessel, and

(d) continuously drawing off a product stream from the equilibration system, wherein the product stream comprises a polycarbonate oligomer mixture, and

(ii) introducing the polycarbonate oligomer mixture from step (i) to a polycondensation system to build molecular weight, thereby producing polycarbonate.

26. The method of claim 25, wherein the melted dihydroxy compound is provided from a melting apparatus, and wherein the dihydroxy compound has a total residence time in the melting apparatus and the equilibration system such that the polycarbonate oligomer mixture has a Yellowness Index (YI) of less than 10.

27. The method of claim 26, wherein the residence time in the melting apparatus is less than 30% of the residence time in the equilibration system.

28. The method of claim 26, wherein the melted dihydroxy compound is provided from a melting apparatus, and wherein the dihydroxy compound has a total residence time in the melting apparatus and the equilibration system such that the polycarbonate oligomer mixture has a Yellowness Index (YI) of less than 5.

29. The method of claim 26, wherein the melting apparatus comprises a thin film turbulizing melter.

30. The method of claim 25, wherein the reaction mixture is maintained at an oligomerization temperature of between 140 °C and 300 °C.

31. The method of claim 25, wherein the dihydroxy composition comprises BPA.

32. The method of claim 31, wherein the dihydroxy composition further comprises one or more the additional dihydroxy compounds different from BPA.

33. The method of claim 25, wherein the dihydroxy composition consists essentially of BPA.

34. The method of claim 25, wherein the activated diaryl carbonate composition comprises BMSC.

35. The method of claim 34, wherein the activated diaryl carbonate composition further comprises one or more additional activated diaryl carbonate compounds different from BMSC.

36. The method of claim 34, wherein the dihydroxy composition comprises BPA.

37. The method of claim 25, wherein the activated diaryl carbonate composition consists essentially of BMSC.

38. The method of claim 25, wherein the dihydroxy composition is melted by means which prevent substantial degradation of the dihydroxy composition.

39. The method of claim 25, wherein the activated diaryl carbonate composition is melted by means prevent substantial degradation of the activated diaryl carbonate.

40. The method of claim 25, wherein the equilibration system is operated at atmospheric pressure.

41. The method of claim 25, wherein the means for mixing the reaction mixture comprises a recirculation feed whereby a portion of the polycarbonate oligomer mixture is recirculated to the equilibration system.

42. The method of claim 41, wherein the recirculation feed flow rate is higher than the feed flow rate of dihydroxy composition.

43. The method of claim 41, wherein the dihydroxy composition is combined with the recirculation feed prior to introduction to the equilibration system.

44. The method of claim 25, wherein the dihydroxy composition and the activated diaryl carbonate composition are present in molar ratios of 0.25:1 to 3:1.

45. The method of claim 44, wherein the dihydroxy composition and the activated diaryl carbonate composition are present in molar ratios of 0.9:1 to 1.5:1.

46. The method of claim 25, further comprising the step of filtering the polycarbonate oligomer mixture prior to introducing it to the polycondensation system.

47. The method of claim 25, wherein the reaction mixture is maintained at a temperature of 10 °C lower than the melting temperature of the highest melting dihydroxy compound.

48. The method of claim 47, wherein the reaction mixture is maintained at a temperature of 30 °C lower than the melting temperature of the highest melting dihydroxy compound.

49. The method of claim 48, wherein the reaction mixture is maintained at a temperature of 100 °C lower than the melting temperature of the highest melting dihydroxy compound.

50. A molded article formed from polycarbonate produced by the method, comprising the steps of:

(i) preparing a polycarbonate oligomer mixture comprising the steps of:

(a) providing an equilibration system comprising a vessel, a reaction mixture contained within the vessel, and means for mixing the reaction mixture contained within the vessel wherein the reaction mixture comprises,

i. a melted activated diaryl carbonate composition, and

ii. a catalyst present in sufficient amount to initiate an oligomerization reaction between a dihydroxy composition and the activated diaryl carbonate to form polycarbonate oligomers,

(b) introducing a melted dihydroxy composition to the reaction mixture contained within the equilibration system,

(c) maintaining the reaction mixture contained within the vessel at an oligomerization temperature, said oligomerization temperature being below the melting points of the dihydroxy composition, and sufficiently high to allow formation of a homogeneous melt within the vessel, and

(d) continuously drawing off a product stream from the equilibration system, wherein the product stream comprises a polycarbonate oligomer mixture, and

(ii) introducing the polycarbonate oligomer mixture from step (i) to a polycondensation system to build molecular weight, thereby producing polycarbonate, and

(iii) forming a molded article from the polycarbonate.

51. A method for making a molded article formed from polycarbonate produced by the method, comprising the steps of:

(i) preparing a polycarbonate oligomer mixture comprising the steps of:

(a) providing an equilibration system comprising a vessel, a reaction mixture contained within the vessel, and means for mixing the reaction mixture contained within the vessel wherein the reaction mixture comprises,

i. a melted activated diaryl carbonate composition, and

ii. a catalyst present in sufficient amount to initiate an oligomerization reaction between a dihydroxy composition and the activated diaryl carbonate to form polycarbonate oligomers,

(b) introducing a melted dihydroxy composition to the reaction mixture contained within the equilibration system,

(c) maintaining the reaction mixture contained within the vessel at an oligomerization temperature, said oligomerization temperature being below the melting point of the dihydroxy

composition, and sufficiently high to allow formation of a homogeneous melt within the vessel, and

(d) continuously drawing off a product stream from the equilibration system, wherein the product stream comprises a polycarbonate oligomer mixture, and

(ii) introducing the polycarbonate oligomer mixture from step (a) to a polycondensation system to build molecular weight, thereby producing polycarbonate, and

(iii) forming a molded article from the polycarbonate.

52. An apparatus for making polycarbonate comprising:

(a) one or more melters containing either separately or in combination an activated diaryl carbonate composition and a dihydroxy composition;

(b) a equilibration vessel connected to the one or more melters and receiving melted activated diaryl carbonate composition and melted dihydroxy composition therefrom via one or more monomer feed lines;

(c) a feed line connected to the equilibration vessel and containing a polymerization catalyst;

(d) a polycondensation system, wherein the polycondensation system is connected at one end to the equilibration vessel; and

(e) a transfer line connecting the equilibration vessel to the polycondensation system and containing an oligomer stream;

wherein the equilibration vessel has a size and the apparatus has a flow rate that are selected in combination such that the residence time of the activated diaryl carbonate composition and the dihydroxy composition in the equilibration vessel is sufficient to produce polycarbonate oligomers within the equilibration vessel.

53. The apparatus of claim 52, wherein the activated diaryl carbonate composition comprises

BMSC.

54. The apparatus of claim 53, wherein the activated diaryl carbonate composition further comprises one or more additional activated diaryl carbonate compositions different from BMSC.

55. The apparatus of claim 52, wherein the activated diaryl carbonate composition consists essentially of BMSC.

56. The apparatus of claim 52, wherein the one or more melters are selected such that substantial degradation of the dihydroxy composition does not occur in the one or more melters.

57. The apparatus of claim 52, wherein the one or more melters are selected such that substantial degradation of the activated diaryl carbonate composition does not occur in the one or more melters.

58. The apparatus of claim 52, further comprising a recirculation feed line extending from the transfer line to the equilibration vessel and containing a portion of the oligomer stream, whereby a portion of the oligomer stream is recirculated to the equilibration vessel.

59. The apparatus of claim 58, wherein the one or more monomer feed lines are combined with the recirculation feed line.

60. The apparatus of claim 52, wherein the one or more melters are selected from the group consisting of thin film melters, jacketed tubular melters with internal agitation, jacketed agitated vessels, jacketed agitated vessels with a recirculation line with or without heat exchanger, jacketed screw conveyors, two phase shell and tube heat exchangers, extruders, and two phase static mixers.

61. A method of preparing a polycarbonate oligomer mixture comprising the steps of:

(a) providing an equilibration system comprising a vessel, a reaction mixture contained within the vessel, and means for mixing the reaction mixture contained within the vessel wherein the reaction mixture comprises,

i. a melted activated diaryl carbonate composition, and

ii. a catalyst present in sufficient amount to initiate an oligomerization reaction between a dihydroxy composition and the activated diaryl carbonate to form polycarbonate oligomers,

(b) introducing a melted dihydroxy composition to the reaction mixture contained within the equilibration system, wherein the dihydroxy composition is selected from the group consisting of 2,6-dihydroxy naphthalene; 2,6-dihydroxy-3-methyl naphthalene; and 2,6-dihydroxy-3-phenyl naphthalene, and

(c) continuously drawing off a product stream from the equilibration system, wherein the product stream comprises a polycarbonate oligomer mixture, wherein the melted dihydroxy compound is provided from a melting apparatus, and wherein the dihydroxy compound has a total residence time in the melting apparatus and the equilibration system such that the polycarbonate oligomer mixture has a Yellowness Index (YI) of less than 10.